AD NUMBER

AD903500

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to U.S. Gov't. agencies only; Test and Evaluation; Sep 1972. Other requests shall be referred to Ogden Air Materiel Area, Hill AFB, UT 84406.

AUTHORITY

OAMA USAF ltr, 27 Jul 1973

YP-MMAER/RM-72-108

JUNE 1972

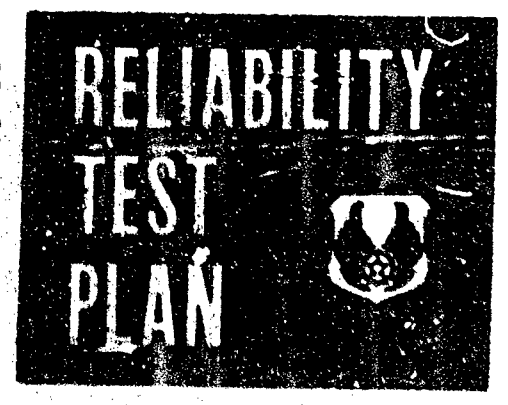
RELIABILITY TEST PLAN

AND PROCEDURES FOR

C-4453/APQ-10[illegible] AND C-6410/APQ-109

RADAR INDICATOR CONTROL UNITS

SERVICE ENGINEERING DIVISION
OGDEN AIR MATERIEL AREA
HILL AFB, UTAH 84401



TP-MMER/RM-72-108

RELIABILITY ENGINEERING

TEST PLAN

June 1972

Prepared By
Reliability Section (MMERR)
Service Engineering Division
Ogden Air Materiel Area
Hill Air Force Base, Ogden, Utah 84406

TP-MMER/RM-72-108

RELIABILITY TEST PLAN

AND PROCEDURES FOR

C-4453/APQ-100 AND C-5410/APQ-109 INDICATOR CONTROL UNITS

Prepared by: Kenneth M Hentges

K. HENTGES, Capt, USAF
Reliability/Maintainability Engineer

Approved by: Angelo Pappas

A. PAPPAS
Chief, Reliability Section

Approved by: Murray Edwards

M. EDWARDS, Lt Col., USAF
Chief, Reliability & Value Engrg Br

Approved by: R W Goodfellow

R. W. GOODFELLOW, Deputy Chief
Service Engineering Division

ABSTRACT

This document presents the requirements, definitions, and methods necessary to demonstrate the reliability of the C-4453/APQ-100 and C-6410/APQ-109 Radar Indicator Control Units (ICUs). This test is in support of the Rivet Haste II program and an essential part of the F-4 fire control systems Increased Reliability of Operational Systems (IROS) program.

TABLE OF CONTENTS PAGE

TABLE OF CONTENTS (CONT'D) PAGE

FIGURES PAGE

TABLES

1.0 INTRODUCTION

1.1 GENERAL

This test plan specifies the reliability demonstration test to be conducted on the C-4453/APQ-100 Radar Indicator Control Unit (ICU) as part of the Rivet Haste II program and the F-4 fire control system Increased Reliability of Operational Systems (IROS) program. Due to the similarity between the C-4453 and C-6410/APQ-109 ICUs, and since the proposed modification is the same for both units, only the C-4453 ICU will be tested.

1.2 PURPOSE OF TEST

The purpose of the testing is to establish reliability parameters for determining the relative improvement between baseline configured (unmodified) C-4453 ICUs and ICUs incorporating the modifications outlined in OOAMA Service Engineering Report TR-MMER/RM-72-102, Operating the DOD with Less Money and Less Manpower. Testing of both the unmodified and modified units will be in accordance with MIL-STD-781B, Test Level E.

1.3 APPLICABLE DOCUMENTS

The following documents, of the exact issue shown, form a part of this test plan to the extent specified herein.

MIL-STD-781B	Reliability Tests: Exponential Distribution Notice 1 dated 15 November 1967
MIL-STD-721B	Definitions of Effectiveness Terms for Reliability, Maintainability, Human Factors, and Safety Notice 1 dated 10 March 1970
T.O. 12P2-2APQ100-2-4	Field Maintenance Instructions - Radar Set, Type AN/APQ-100, Vol. IV (Westinghouse)-F4C Change 7, dated February 1, 1972.

T.O. 33D5-12-172-1 Operator and Service Instructions with IPB - Indicator and Indicator Control Test Station, P/N 401R507G01 (Westinghouse) (Conf-Gp 3) Change, dated 1 June 1969

T-7120605 Inspection Test Procedures for Indicator Control and Semi-Composite of Indicator System for AN/APQ-100 (Westinghouse) Revision J, dated 6 January 1965

T-712603 Inspection Test Procedure for B-Gun Circuitry for AN/APQ-100 Indicator Control (Westinghouse) Revision H,dated 15 June 1965

T-712602 Inspection Test Procedure for A-Gun Circuitry for AN/APQ-100 Indicator Control (Westinghouse) Revision H dated 18 June 1965

1.3.1 PRECEDENCE OF DOCUMENTS

In the case of conflict between requirements of this test plan and those contained in the applicable documents, the order of precedence shall be as follows:

a. This Test Plan
b. MIL-STD-781B
c. MIL-STD-721B
d. T-7120605
e. T.O. 33D5-12-172-1
f. T-712603
g. T-712602
h. T.O. 12P2-2APQ100-2-4

2.0 GENERAL TEST REQUIREMENTS

2.1 QUANTITY OF TEST SPECIMENS

Three (3) unmodified (baseline) ICUs and four (4) ICUs incorporating the proposed modification.

2.2 TEST LEVEL

Modified Test Level E of MIL-STD-781B shall be used during the testing. The conditions of the modified test level are as follows.

(1) Temperature . . . . . -54°C to +55°C (-65°F to +131°F)

(2) Temperature Cycling . . . . . Temperature Cycling shall be time to stabilize at low temperature, followed by time to stabilize at high temperature, plus 2 hours. See Figure 1 for more detail.

(3) Vibration . . . . . 2.2G ± 10% peak acceleration value at any nonresonant frequency between 20 and 60 Hz measured at the mounting points on the equipment. The duration of vibration shall be least 10 minutes during each hour of operating time. See Figure 1 for more detail.

(4) Equipment On-Off Cycling . . . . . Equipment off during portion of cooling cycle from room ambient temperature (80°F) until stabilized lower temperature limit is reached. Equipment on during heating cycle, plus 2 hours operation at stabilized high temperature limit, plus portion of cooling cycle down to room ambient temperature. See Figure 1 for more detail.

(5) Input Voltage . . . . . Nominal specified voltage, ±5%

(6) Input Voltage Cycling . . . . . Not required.

2.3 TEST CRITERIA

The accept and reject criteria for this test were constructed utilizing the statistical properties of the F-distribution. That is, the times-to-failure of both the modified and unmodified units are assumed to follow a negative exponential probability distribution, which is the expected distribution based on past history of complex electronic equipment such as the test units. Based on this assumption, the respective MTBF's of the modified and unmodified units will be Chi-Square distributed. The ratio of two Chi-Square variables, when each is divided by its associated number of degrees of freedom, is F-distributed. Therefore, it can be shown that the ratio of the MTBF's of the modified and unmodified units is F-distributed. The details of this derivation can be found in OOAMA Service Engineering Technical Report TR-MMER/RM-72-110 (to be published).

Utilizing the above theory, critical values were determined for the combination of relevant failures and operating times on the modified and unmodified units required to demonstrate the desired improvement factor. The critical values for the accept criteria are based on demonstrating an improvement factor of 3.6 or greater for the ICU's. The critical values for the reject criteria are based on demonstrating an improvement factor of 3.0 or less for the ICU's. Both the accept and reject criteria are based on a confidence level of 90%.

The optimum test truncation time was determined to be one thousand (1000) accumulative operating hours on both the modifed and unmodified units. This was determined by utilizing the Poisson distribution and comparing the probability of making an accept/reject decision with test time.

Based on this time truncation point, the failure truncation point was determined to be ten (10) failures on the modified units. Test truncation on failures of the unmodified units is not applicable since it depends strictly on the number of failures on the modified units.

A summary of the quantitative requirements of the test criteria is given in Table 1. The accept and reject criteria are given in Tables 2 and 3 respectively.

TABLE I

SUMMARY OF TEST REQUIREMENTS

D_o = Minimum accept improvement factor = 3.6

D_1 = Maximum reject improvement factor = 3.0

Confidence Level = 90%

Test Truncation Time = 1000 operating hours (on modified and on unmodified units)

Test Failure Truncation = ten failures on modified units

2.4 TEST CYCLE

The test cycle is depicted in Figure 1 and will consist of the following.

(1) With the test specimens non-operating, the test specimen temperature will be reduced to -65°F and maintained until specimen stabilization is reached. The stabilization time is derived from the thermal survey.

(2) Following specimen stabilization, the specimens will be switched on and allowed to warm-up for five (5) minutes. The specimen temperature will then be increased to +131°F.

(3) Application of vibration at the 2.2G ± 10% level, and at the frequency determined in the vibration survey, will be applied to the specimens for ten (10) minutes of each operating hour, beginning with the first hour of operation.

(4) When the specimens have reached +131°F, and have stabilized as determined by the thermal survey, they shall be operated an additional two (2) hours.

(5) Following the two (2) hour operating period, the specimens will be decreased to +80°F at which point the test specimens will be turned off. The specimen temperature will then be decreased to -65°F for start of the next cycle.

TIME RATIO (T_2/T_1) FOR ACCEPT DECISION

r_2 \ r_1	0	1	2	3	4	5	6	7	8	9	10
1	.031	.015	.01	.003	.006	.005	.004	.004	.004	.003	.003
2	.128	.068	.046	.035	.028	.024	.022	.019	.017	.014	.013
3	.241	.131	.091	.07	.057	.048	.043	.039	.034	.029	.027
4	.357	.198	.137	.107	.088	.074	.067	.06	.053	.046	.042
5	.475	.267	.188	.146	.119	.101	.092	.082	.073	.063	.058
6	.593	.336	.238	.185	.152	.129	.117	.105	.093	.091	.074
7	.714	.406	.289	.225	.186	.157	.143	.128	.114	.099	.092
8	.833	.478	.342	.267	.219	.184	.168	.151	.134	.118	.109
9	.952	.547	.392	.305	.253	.212	.193	.174	.155	.136	.126
10	1.07	.618	.443	.347	.287	.239	.218	.197	.176	.155	.143
11	1.19	.689	.494	.389	.319	.271	.247	.223	.195	.174	.161
12	1.31	.760	.546	.429	.353	.303	.276	.248	.221	.193	.178
13	1.43	.831	.597	.472	.389	.333	.303	.272	.242	.212	.196
14	1.56	.903	.650	.514	.422	.361	.331	.297	.364	.231	.213
15	1.65	.973	.701	.554	.458	.892	.356	.321	.286	.250	.231
16	1.79	1.04	.753	.594	.492	.422	.383	.344	.308	.269	.249
17	1.92	1.11	.806	.636	.528	.450	.411	.369	.328	.289	.267
18	2.04	1.19	.858	.678	.561	.481	.436	.394	.350	.308	.283
19	2.16	1.26	.908	.719	.594	.511	.464	.419	.372	.328	.303
20	2.28	1.33	.961	.760	.630	.540	.491	.443	.394	.346	.320
21	2.40	1.40	1.01	.800	.664	.569	.519	.467	.417	.367	.342
22	2.52	1.47	1.06	.842	.700	.600	.544	.492	.439	.383	.350
23	2.64	1.54	1.11	.883	.733	.628	.572	.517	.461	.403	.375
24	2.76	1.61	1.17	.925	.769	.658	.600	.542	.483	.422	.392
25	2.88	1.68	1.22	.965	.803	.689	.627	.566	.504	.443	.410
26	3.00	1.76	1.27	1.01	.839	.719	.656	.592	.525	.461	.428
27	3.12	1.83	1.32	1.05	.872	.750	.683	.614	.547	.481	.447
28	3.24	1.90	1.38	1.09	.908	.778	.708	.639	.569	.500	.464
29	3.36	1.97	1.43	1.13	.942	.808	.736	.664	.592	.519	.433
30	3.48	2.04	1.48	1.17	.977	.839	.764	.689	.615	.540	.500

D_o = 3.6
r_1 = Failures on modified
r_2 = Failures on unmodified
T_1 = Time on modified
T_2 = Time on unmodified

TABLE 2: ACCEPT CRITERIA

TIME RATIO (T_2/T_1) FOR
REJECT DECISION

r_2 \ r_1	1	2	3	4	5	6	7	8	9	10
0	3.00	.720	.383	.260	.103	.157	.139	.122	.104	.087
1	6.16	1.37	.707	.470	.347	.273	.243	.212	.181	.150
2	9.33	2.00	1.03	.670	.490	.390	.343	.299	.254	.209
3	12.49	2.63	1.3	.863	.627	.493	.437	.380	.323	.267
4	15.65	3.27	1.63	1.07	.773	.617	.543	.470	.397	.323
5	18.82	3.90	1.97	1.25	.920	.717	.633	.547	.463	.377
6	21.98	4.53	2.24	1.44	1.06	.820	.727	.627	.530	.433
7	25.14	5.15	2.55	1.63	1.19	.927	.817	.707	.597	.487
8	28.37	5.78	2.86	1.83	1.33	1.03	.910	.787	.663	.543
9	31.47	6.40	3.17	2.02	1.47	1.13	1.00	.867	.730	.597
10	34.63	7.03	3.46	2.22	1.61	1.25	1.10	.950	.800	.650
11	37.80	7.66	3.76	2.40	1.74	1.36	1.20	1.03	.867	.700
12	40.97	8.29	4.06	2.59	1.88	1.47	1.30	1.12	.937	.757
13	44.13	8.92	4.36	2.78	2.02	1.59	1.39	1.20	1.07	.813
14	47.30	9.55	4.67	2.98	2.16	1.70	1.49	1.29	1.08	.870
15	50.47	10.17	4.97	3.17	2.30	1.80	1.58	1.36	1.14	.923
16	53.63	10.80	5.27	3.36	2.43	1.90	1.67	1.44	1.21	.977
17	56.80	11.42	5.57	3.55	2.57	2.01	1.76	1.52	1.27	1.03
18	49.97	12.04	5.87	3.74	2.70	2.11	1.84	1.60	1.34	1.09
19	63.13	12.67	6.18	3.93	2.84	2.21	1.94	1.68	1.41	1.14
20	66.29	13.30	6.48	4.13	2.98	2.32	2.04	1.76	1.47	1.19
21	69.45	13.93	6.78	4.32	3.12	2.24	2.13	1.84	1.54	1.25
22	72.60	14.57	7.09	4.51	3.26	2.53	2.22	1.91	1.61	1.30
23	75.76	15.20	7.39	4.70	3.39	2.63	2.31	1.99	1.68	1.36
24	78.92	15.83	7.69	4.90	3.53	2.74	2.41	2.07	1.74	1.41
25	82.07	16.46	7.99	5.09	3.67	2.84	2.50	2.15	1.81	1.46
26	85.23	17.08	8.30	5.28	3.81	2.95	2.59	2.23	1.88	1.52
27	88.39	17.70	8.60	5.47	3.95	3.05	2.68	2.31	1.94	1.57
28	91.54	18.33	8.90	5.66	4.08	3.16	2.78	2.39	2.01	1.63
29	94.70	18.95	9.20	5.85	4.22	3.27	2.87	2.47	2.08	1.68

D = 3.0
r_1^1 = Failures on modified
r_2^1 = Failures on unmodified
T_1 = Time on modified
T_2^1 = Time on unmodified

TABLE 3: REJECT CRITERIA

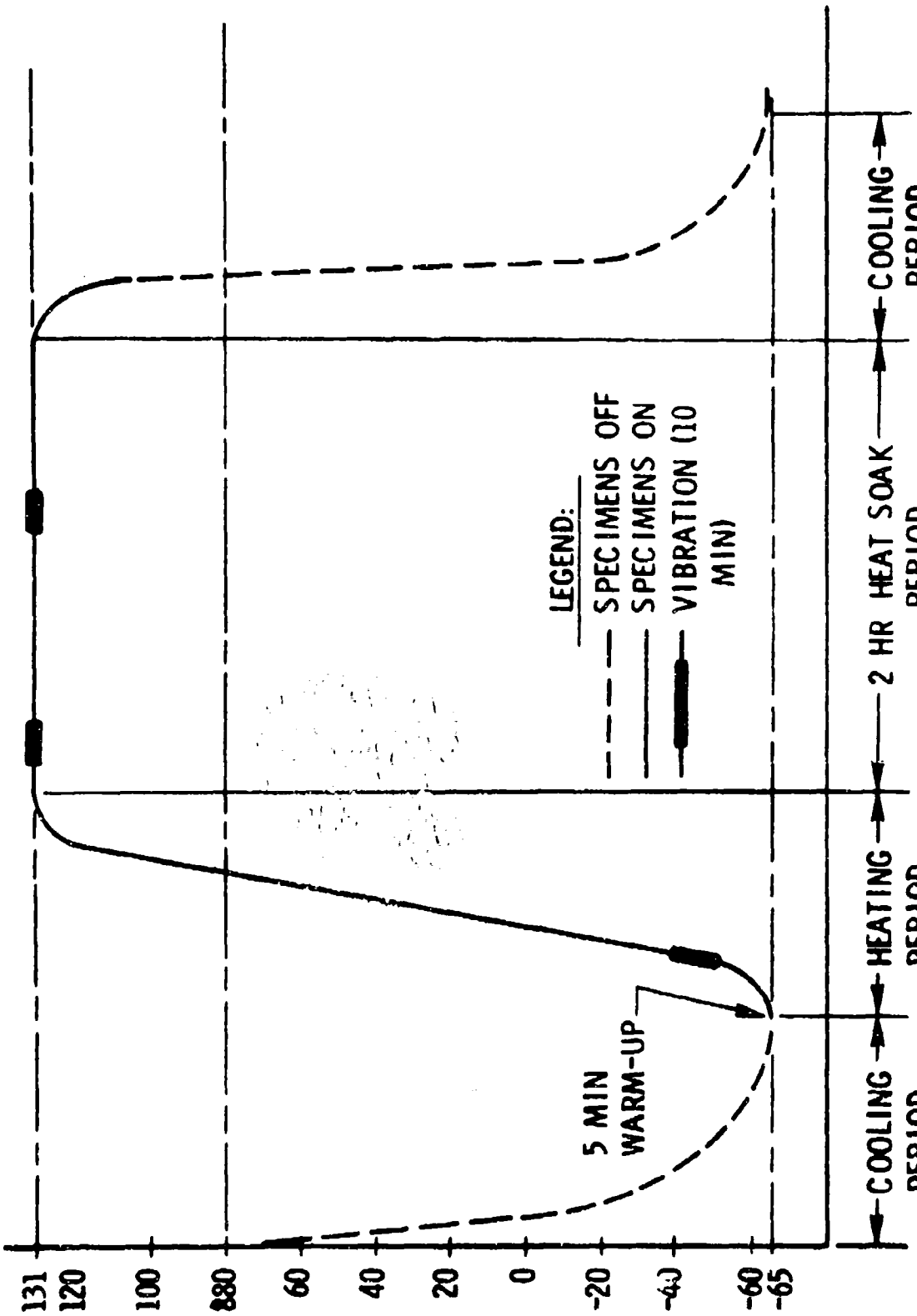


FIGURE 1: TEST CYCLE

3.0 TEST CONFIGURATION AND PROCEDURES

3.1 TEST LOCATION/EQUIPMENT

The test will be conducted by OOAMA/MMETAW in building S-882 at Hill Air Force Base, Utah. The reliability test chamber to be used is a Thermotron model F-144-CHV-25-25-25-25 incorporating a model 211 Marshall vibration unit.

3.2 TEST SPECIMENS AND INSTALLATION

The test specimens consist of four (4) modified and three (3) unmodified ICUs. Three modified and three unmodified specimens will be mounted on a vibration table, in a temperature chamber, including all mechanical and electrical connections required to operate/monitor the specimens. The specimens will be mounted on the vibration table such that one of the modified and unmodified units is oriented in each of three rectangular axes (see Figure 2). No external environmental air shall be generated to the test specimens during the test.

3.3 TEST PROCEDURES

The following procedures shall be utilized to monitor the test specimens during the "on-time" portion of the test cycle. The complete procedure shall be accomplished at least once during each fifteen (15) minutes of equipment "on-time". Each ICU shall be checked by setting switch positions on the control consoles and verifying that the symbols displayed on the radar indicators are within the specifications shown on the indicator scope overlays and verified on the test check-off sheet. The time when each check is accomplished shall be recorded. These procedures are in accordance with applicable technical orders and test specifications and have been approved by OOAMA/MMETAW, MMEEA, and MMERR.

(1) Power Application

a. Power Cart - ON

b. Power Supplies - ON

c. Master Switch - ON

d. Input Supplies - Verify Voltages

e. Indicator Switch - ON

f. Delay Switch - ON after 30 secs.

g. ICU Power - ON

h. ICU Signal - ON

i. ICU Selector - Verify normal display on all six positions (leave on #6)

(2) Mode Switching Panel

a. AI RDR, MAP-B, BST - ON

b. BIT #3 - ON

c. 25 Mile - ON

d. Acquisition - ON

e. Range Lock - ON

f. Track Display - ON

(3) Verify that symbols are within tolerances as outlined on overlay #1 and check on test check-off sheet.

(4) Verify that symbols are within tolerance as outlined on overlay #2 and check on test check-off sheet.

(5) Set Mode Switching Panel to each range setting and verify range switching results per test check-off sheet.

(6) Set Mode Switching Panel on each of the following positions and verify results per test check-off sheet.

a. STAB OUT

b. BREAK X

c. EXPANDED SWEEP

(7) Rotate the ICU Selector through the remaining five positions and repeat steps (3) through (6) for each of the ICUs.

4.0 THERMAL/VIBRATION SURVEY

4.1 THERMAL SURVEY

A thermal survey shall be made of the equipment to be tested, under test level temperature cycling prior to the initiation of testing. The purpose of this survey is to identify the component of greatest thermal inertia and to establish the time temperature relationship between it and the chamber air. This relationship shall be used to determine the thermal stabilization of the equipment during the test. The lower test level temperature stabilization takes place when the temperature of the point of maximum thermal inertia is within $2^{\circ}C$ of the lower test level temperature and its rate of change is less than $2^{\circ}C$/hour. Upper test level temperature stabilization takes place when the rate of change of the point of maximum thermal inertia at the upper temperature limit is less than $2^{\circ}C$/hour. The techniques and results of the thermal survey shall be described by MMETAW and submitted to MMERR. The tests shall be run according to the approved procedures. Temperatures of the heating-cooling air shall be recorded continuously during both survey and testing.

4.2 VIBRATION SURVEY

A vibration survey shall be conducted over the frequency range of 20 to 60 Hz. A nonresonant frequency selected in this range will be used in performing vibration during the Reliability Test. A strobe light will be used to verify that resonant modes are not present. The techniques and results of the vibration survey shall be described by MMETAW and submitted to MMERR.

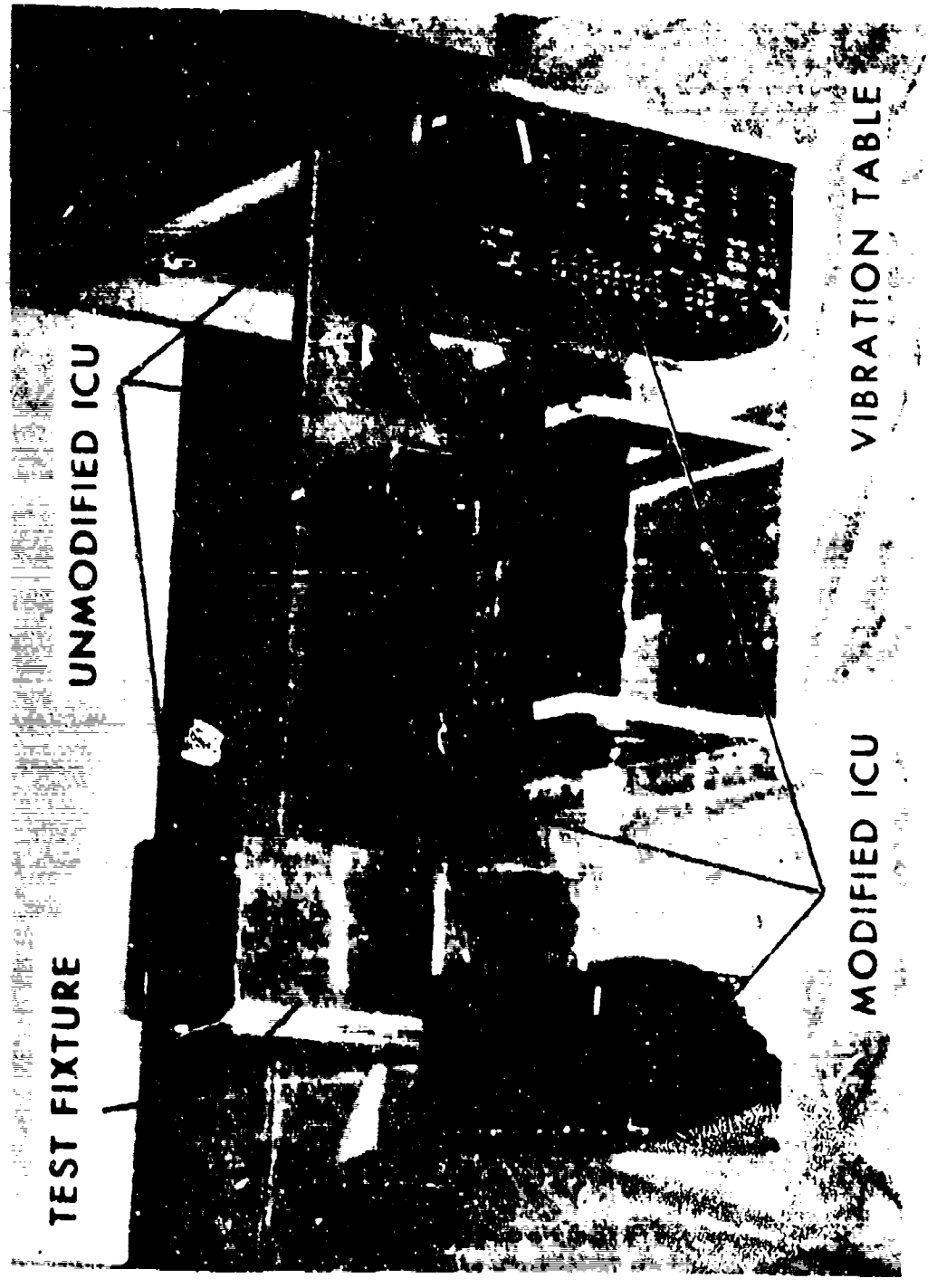


FIGURE 2

TEST SPECIMEN SETUP

5.0 TEST DATA REPORTING

5.1 TEST INSTRUMENTATION REQUIREMENTS

Provisions shall be made to determine that the test specimen inputs are within tolerances (see paragraph 2.2(5)) and that the specimen outputs are within limits as specified in the applicable documents. The chamber temperature shall be monitored and recorded continuously during the test.

5.1.1 INPUT REQUIREMENTS

The following inputs are required for each specimen on test.

(1) Phase A, B, and C power.

(2) B+ DC power.

(3) 28VDC power.

(4) A-Gun inputs

(5) B-Gun inputs

5.1.2 OUT REQUIREMENTS

The following outputs will be monitored for each specimen on test.

(1) Range Rate Circle

(2) ASE Circle.

(3) Aim dot.

(4) Horizon Line

(5) Elevation Strobe

(6) Maximum Range Strobe

(7) Minimum Range Strobe

(8) B Sweep

(9) Acquisition Symbol

(10) Range Rate Gap

5.2 ENGINEERING TEST PROJECT LOG

An Operational Information Log shall be maintained during all operations of the test specimens. This log shall be used to record elapsed time readings, operating time, accumulated time and signature of observer. Remarks shall be included which record significant events or notes applicable to the periods of operation. Figure 3 is the Engineering Test Project Log that will be used.

5.3 FAILURE REPORTING

Whenever a discrepancy occurs, a failure report shall be initiated to record the event and describe the discrepancy. A failure analysis report shall be initiated following analysis and ultimate resolution of the problem. Figures 4 and 5, respectively, are the Item Failure and Failure Analysis Reports.

5.4 FAILURE CRITERIA

During this reliability test, the failure criteria of MIL-STD-721B as clarified/amplified in this test plan shall apply. A failure is defined as any catastrophic cessation of function in any part of the test specimens or any degradation such that the related performance cannot be maintained within the specified tolerances.

5.4.1 RELEVANT FAILURE CRITERIA

A relevant failure is any verified failure, as defined above, that cannot be classified as a nonrelevant failure in accordance with the criteria of paragraph 5.4.2.

In the event that a discrepancy is noted for which there is no set failure criteria, that discrepancy will be recorded in the test log along with

ENGINEERING TEST PROJECT LOG			PAGE OF PAGES
1. TYPE TEST		2. EQUIPMENT TESTED	
DATE A	TIME B	COMMENTS/ACTION C	INITIALS D

FIGURE 3: ENGINEERING TEST PROJECT LOG

OOAMA FORM MAR 72 398

ITEM FAILURE REPORT			1. Report Number
2. Failed Part Name	3. Failed P/N	4. Serial No.	5. Mfgr.
	6. MOD No.	7. Appl. TCTO/ECP	8. Project No.
9. Next Higher Assy	10. NHA P/N	11. NHA S/N	12. Mfgr.
13. System	14. System S/N	15. Model	16. Follow-up Rpt No.
17. Failure Discovered During (Check) ☐ Thermal Survey ☐ Vibration Survey ☐ Repair Verif. ☐ Reliability Demo. ☐ Other		18. Test Location	19. Test Plan
20. FAILURE DESCRIPTION, PRELIMINARY DIAGNOSIS, TEST CONDITIONS			
21. Cause of Failure or Stress (Check) ☐ Assembly ☐ Workmanship ☐ Part ☐ Design ☐ Material ☐ Other ☐ Test Equip.		22. Disposition 24. Fail Date	23. Operating Time 25. Time
26.	27.	28. Reported By	29. Page ____ Of ____

FIGURE 4: ITEM FAILURE REPORT

FAILURE ANALYSES REPORT			1. Report Number
2. Failed Part Name	3. Failed P/N	4. Serial No.	5. Failure Date
	6. MOD No.	7. Mfgr	8. Failure Rpt No.
9. Next Higher Assy	10. NHA P/N	11. NHA S/N	12. Project No.
13. System	14. System S/N	15. Model	16. NHA Mfgr

17. Cause of Failure (Check)	18. Stress Causing Damage (Check)
☐ Assembly ☐ Other	☐ Electrical ☐ Other
☐ Part	☐ Mechanical
☐ Material	☐ Pressure
☐ Test Equip	☐ Temperature
☐ Workmanship	☐ Humidity
☐ Design	☐ Overload

19. DESCRIPTION OF FAILURE

20. ANALYSES OF FAILURE

21. CORRECTIVE ACTION

22. Analyzed By	23. Date	24. Page____ Of____

FIGURE 5: FAILURE ANALYSIS REPORT

related information and corrective actions required. MMETAW, MMEEA, and MMERR personnel will then review the test log data and determine whether the discrepancy should be classified as a relevant or nonrelevant failure.

5.4.2 NON RELEVANT FAILURE CRITERIA

A failure of a test specimen caused by a condition external to the system under test which is not a test requirement and not encountered in actual service shall be classified as nonrelevant. The following list itemizes causes of failures which shall be classified nonrelevant. Nonrelevant failures shall not be used for the establishment of the formal accept/reject decision.

(1) Failures caused by human error of test personnel (e.g. positioning of switch incorrectly during test).

(2) Failures caused by malfunctions of test equipment or the test facility.

(3) Failures of any interconnecting item, such as wiring harnesses used in testing, which is not a part or component of normal equipment configuration in service applications.

(4) Failures which occur as a result of operation of the equipment in excess of specification limits, such as the application of excessive external voltages, loads, acceleration, and shock.

(5) A non-recurring phantom failure is indicated on test monitoring equipment which cannot be subsequently verified.

(6) Failures of the indicator lights and fuses.

(7) Failures occurring in the specimens during fault isolation, provided the time of operation of the equipment is not counted.

(8) Failures occurring during the repair verification portion of the test cycle after reinstatement into the chamber. The time of operating during this period shall contribute to the total only if a failure does not occur.

6.0 TEST OBJECTIVES AND EVALUATION

6.1 TEST OBJECTIVES

The primary test objectives are:

(1) Verify the reliability improvement factor for the proposed modification.

(2) Determine a reliability baseline, under the conditions of this test plan, for the modified and unmodified ICUs.

6.2 EVALUATION CRITERIA

The evaluation criteria will be as follows:

(1) The determination of the outcome of paragraph 6.1(1) above will be in accordance with paragraph 2.3 of this test plan.

(2) The determination of the values associated with paragraph 6.1(2) above will be accomplished using the Chi-Square distribution for confidence.

7.0 RELIABILITY TEST REPORT

7.1 TEST REPORT PREPARATION

The results of the reliability test conducted on the C-4453 Indicator Control Unit will be contained in a final test report compiled by MMERR.

7.2 TEST REPORT CONTENTS

The test of the final report will contain the following information:

a. Test objectives

b. Brief statement of tests conducted in support of test objectives

c. Test configuration, including equipment, facilities and procedures

d. Brief statement of test results

e. Test evaluation

f. Problems encountered

g. Recommendations/conclusions

h. Test data (graphs, charts, tabulation)

DISTRIBUTION LIST

	No. of Copies
OOAMA	
MME	1
MMEW	1
MMER	1
MMERR	15
MMEEA	5
MMET	1
MMETA	3
MMFTD	2
DCC	5
HQ AFLC/MMEEE	3
HQ AFLC/MMAT	1
OCAMA/MMER	2
SAAMA/MMER	2
SMAMA/MMER	2
WRAMA/MMER	2
ASD/SD4E	2
ASD/RWR	2
AFIT - School of Reliability Engineering - WPAFB	2

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)

Reliability Section (MMERR)
Service Engineering Division
Ogden Air Materiel Area, Hill AFB, UT 84406

2a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED

2b. GROUP: N/A

3. REPORT TITLE

Reliability Test Plan and Procedures for C-4453/APQ-100 and C-6410/APQ-109 Radar Indicator Control Units

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Reliability Test Plan

5. AUTHOR(S) (First name, middle initial, last name)

Kenneth M. Hentges, Capt, USAF

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972	22	0

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. MMERR/2RR 325	TP-MMER/RM-72-108
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	None

10. DISTRIBUTION STATEMENT

11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

Ogden Air Materiel Area
Hill AFB, Utah 84406

13. ABSTRACT

This document presents the requirements, definitions, and methods necessary to demonstrate the reliability of the C-4453/APQ-100 and C-6410/APQ-109 Radar Indicator Control Units (ICUs). This test is in support of the Rivet Haste II program and an essential part of the F-4 fire control system Increase Reliability of Operational Systems (IROS) program.

DD FORM 1 NOV 1473

UNCLASSIFIED

Security Classification